REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. Objection to Drawings

This objection is respectfully traversed on the grounds that, so far as can be determined, reference numeral 9 appears only once in the drawings (Fig. 3, step E7), and on the grounds that the hologram 9 and the "common digital image" are the same element, as explained in lines 30-35 on page 15 (". . .*the quantized and encoded holograms* 90_{11} *to* 90_{NM} *from step E6 are juxtaposed to form a digital image 9. . .The digital image 9 therefore represents a hologram of the virtual object 6. . .*") and lines 1-3 on page 16 ("*In a step E8, the digital image (hologram) 9. . .*").

2. Priority

A new declaration correcting the priority date from 2711/97 to 20/11/97 has been sent to Applicant for execution, and will be submitted as soon as it is returned.

3. Claim Objections

These objections are respectfully traversed on the grounds that all multiple dependencies were deleted in a preliminary amendment submitted with the PCT national stage application papers.

Entry and acknowledgment of the original preliminary amendment is respectfully requested. The changes made by the preliminary amendment are reflected in the amended claims presented above.

4. Rejection of Claims 8, 10-13, 20, and 22-25 Under 35 USC §112, 1st Paragraph

This rejection is respectfully traversed on the grounds that the two components of the convolution product recited in the rejected claims, as well as the operation of the convolution,

are described on pages 12-13 of the original specification. In particular, page 12, lines 31 *et seq.* explain that:

> *. . .The convolutional product conforms to scalar diffraction theory. Fro example, using a Rayleigh-Sommerfeld scalar diffraction formulation, the two components of the convolutional product can respectively correspond to a complex field representing the oversampled complex image* 83_{nm} *and a complex field representing a spherical optical wave of wavelength* λ*. The skilled person however knows other types of convolutional product for computing a diffracted image. The convolutional product computer in step E53 uses parameters including the aforementioned distance D2 and the emission wavelength* λ *of the light source 4.*

In addition, lines 6-34 on page 13 of the original specification explains that the convolutional product is computer by applying a fast complex transform to the above-described two components, and provides specific equations therefor, as well as a detailed explanation of the term "fast complex transform."

It is respectfully submitted that those skilled in the art of holography would have been familiar with scalar diffraction equations and the various transforms used to obtain the convolutional product in the convolutional product equations, and therefore that the skilled artisan would have understood the very detailed description of the convolutional product on pages 12 and 13 of the original specification.

In addition, it is respectfully submitted that the terms "amplitude values" and "corresponding value" are accurate and conform to the description in lines 4-8 of the original specification, which specifies that the amplitude distribution of the complex two-dimensional image 81_{nm} is obtained "*by computing for each point of the* [given] *image* 80_{nm} *the square root of the corresponding intensity value*," although claim 6 has been amended to point out that the corresponding value is in fact the *intensity* value of the given two-dimensional image.

As a result, withdrawal of the rejection under 35 USC §112, 1st Paragraph is respectfully requested.

5. Rejection of Claims 1-25 Under 35 USC §112, 2nd Paragraph

This rejection has been addressed by re-writing claims 1-25 to be in proper U.S. format and to correct various grammatical and idiomatic errors, including those noted by the Examiner in item 7 in pages 4-5 of the Official Action, as well as (it is hoped!) the additional discrepancies alluded to by the Examiner but not specifically described.

6. Rejection of Claims 1-4 and 14-16 Under 35 USC §102(b) in view of U.S. Patent No. 4,969,700 (Haines)

This rejection is respectfully traversed on the grounds that the Haines patent fails to disclose or suggest a method or system of producing a hologram of an object, as recited in claims 1-4 and 14-16, in which the hologram is computed from a set of elementary holograms each representing the object **as seen** from different viewpoints in three-dimensional geometric space, much less a system or method in which the different viewpoint holograms are used to compute a set of elementary holograms from which the final hologram is constructed. Instead, Haines merely discloses construction of a digitized representation of the object in a single plane, as shown in Fig. 4 of Haines, the digitized representation shown in Fig. 4 of Haines corresponding to the matrix of points (70_{nm}) recited in claims **2** and **15** of the present application, and not to the image illustrated in Fig. 8 of the application and recited in claims **1** and **14**.

In particular, while the hologram of Haines is synthesized from a plurality of smaller hologram "elements," the hologram "elements" of Haines do not each represent the object **as seen** from respective different viewpoints in three-dimensional space. Instead, the hologram elements of Haines are simply elements of the two-dimensional given hologram corresponding to sampling points 70_{nm} illustrated in Fig. 4 of the present application. In other words, Haines merely teaches how to construct an image from which the claimed images can be derived, *i.e.*, Haines teaches the given two-dimensional image from which is constructed the claimed "*two-dimensional images 80_{nm} representing the object as seen from respective different viewpoints in three-dimensional geometrical space. . ..*"

Claims 1 and 14 specifically recite that the two-dimensional images "*represent the object as seen from respective different viewpoints in three-dimensional geometrical space.*" These two-dimensional images correspond to the complex image 8 shown in Fig. 4, and not to the real image 7, from which image 8 is constructed. In addition, claims 1 and 14 specifically recite "*computing (E5-E6) a set of elementary holograms (90_{nm}), each of said elementary holograms corresponding to one of said two-dimensional images.*" The Haines patent does not disclose or suggest any image corresponding to image 8, representing the object as seen from different viewpoints in geometrical space, as claimed, much less the corresponding further steps or means for computing "*a set of elementary holograms (90_{nm}), each of said elementary holograms corresponding to one of said two-dimensional images*" seen from different viewpoints, the set of elementary holograms each corresponding to one of the three-dimensional, different viewpoint images being combined to form the final hologram of the object.

Because the Haines patent does not disclose either of the image computing steps of means recited in independent claims 1 and 14, but only discloses the antecedent to these computing steps (which happen to be recited in claims 2 and 15), it is respectfully submitted that the Haines patent does not anticipate the claimed invention, and withdrawal of the rejection of claims 1-4 and 14-16 under 35 USC §102(b) is respectfully requested.

7. Rejection of Claims 5-13 and 17-25 Under 35 USC §103(a) in view of U.S. Patent Nos. 4,969,700 (Haines) and 5,668,648 (Saito), and the SPIE article by Michelin *et al.*

This rejection is respectfully traversed on the grounds that the Saito patent and the Michelin article, like the Haines patent, fails to disclose or suggest any steps or means corresponding to the claimed computation of (i) two-dimensional images *representing the object as seen from different viewpoints in three-dimensional space* and (ii) elementary holograms *each corresponding to one of the two-dimensional images*, the final hologram being formed by a combination of the elementary holograms computed from the two-dimensional images representing the object as seen from different viewpoints in three-dimensional space. Instead, the Saito patent is cited solely for its use of Fourier transforms to generate diffraction elements similar to those that make up the hologram of Haines, while the Michelin article teaches

generally how to use Fourier transformations to compute amplitude transmittance from complex fields representing the reference wave. Both references teach computational techniques that can be used to perform specific computations involved in the claimed method and system, but neither discloses or suggests that these steps be applied in the manner recited in claims 1 and 14. Accordingly, withdrawal of the rejection under 35 USC §103(a) in view of the combination of Haines, Saito, and Michelin, is respectfully requested.

8. Double Patenting Rejection

This rejection is respectfully traversed on the grounds that since the Haines patent does not disclose or suggest the claimed set of two-dimensional image data representing representing the object **as seen** from different viewpoints in three-dimensional geometric space, or a system or method in which the different viewpoint holograms are used to compute a set of elementary holograms from which the final hologram is constructed, the claimed invention does not represent an obvious modification of the calculation process recited in Applicant's U.S. Patent No. 6,344,090. Withdrawal of the obviousness double patenting rejection is therefore respectfully requested.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

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Date: August 21, 2003

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